




Aviation Weather Testbed Purpose and Recent Activity

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April 2, 2013



Criteria for Successful Research to Operations

Operations to Research means keeping these in focus

Demonstrated Benefits

Efficiency

Sustainability

IT compatibility

Necessary Conditions

Must work with AWIPS II

Use operational data sets

R \Leftrightarrow O Priorities

New Science for Meteorologists

Enabling Data for NextGen Weather

**Transition Meteorologists to NextGen
Decision Support**

**Human Factors – Does Presentation
Improve Decision Making**



NOAA Aviation Weather Testbed (AWT)

<http://testbed.aviationweather.gov>

Historically, the NOAA/NWS Aviation Weather Testbed (AWT) focused primarily on implementing Research-to-Operations developed under the FAA Aviation Weather Research Program (AWRP)

- Aviation Digital Data Services (ADDS)
- Graphical Turbulence Guidance (GTG)
- Current/Forecast Icing Potential (CIP/FIP)
- National Convective Weather Forecast (NCWF)
- Ceiling and Visibility Analysis (CVA)



NOAA Aviation Weather Testbed (AWT)

2009 UCAR Review of NCEP

- Recommended formalizing and expanding AWT to engage directly in science infusion and grow external collaborations.
- Recognized the need to modernize operations, gain operational efficiencies (HOTL/HITL), enhance products, and decision support services.

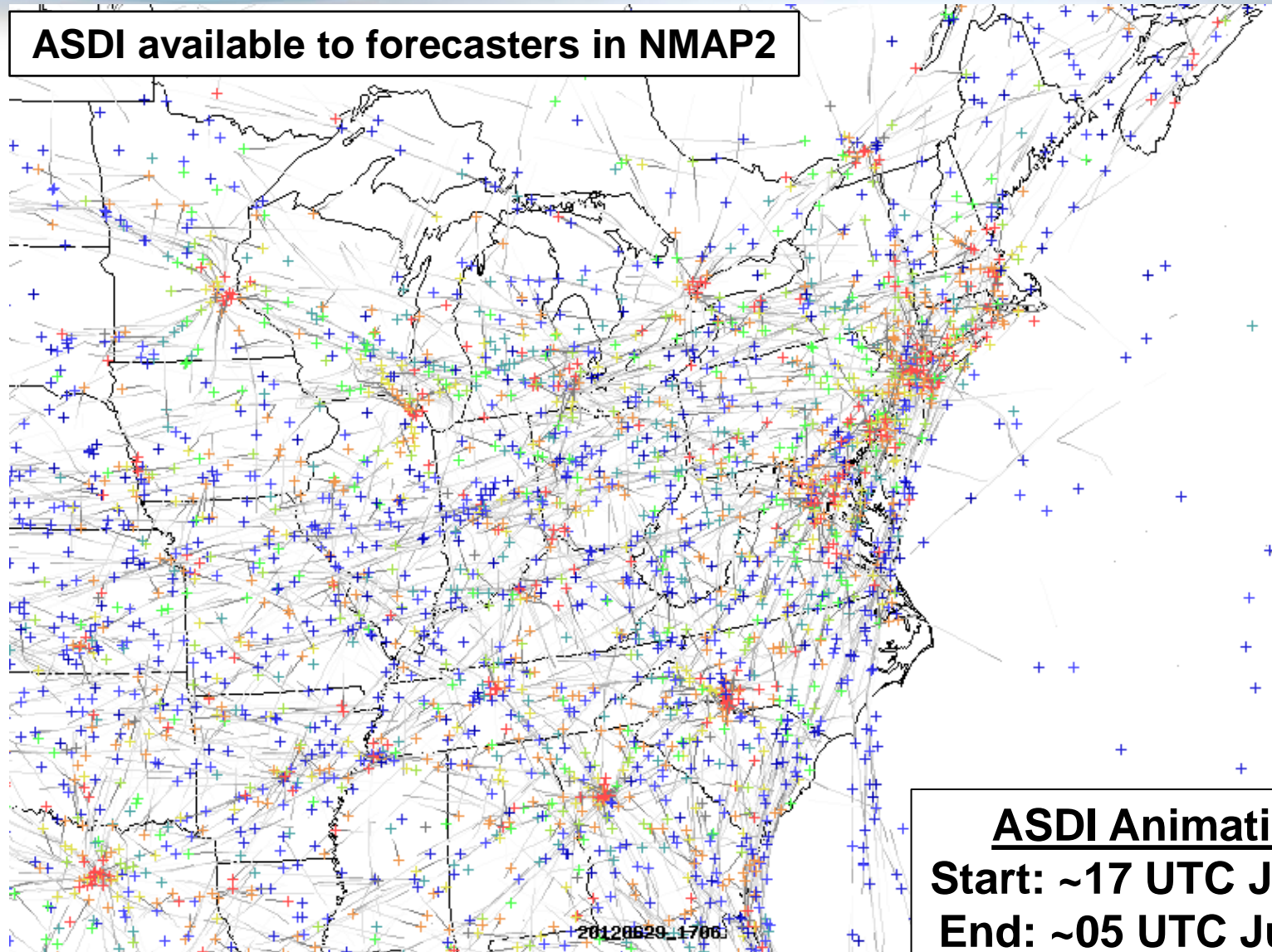


AWT Mission

- Explore and develop science and technology innovations
- Assesses results relative to existing operations
- Accelerates transition of promising technologies into NWS operations
- Is a key player in developing aviation weather services for NextGen
- Focus on support and enhancement of AWC's mission and its customers and partners.

Recent Activities: Visualization into AWC Ops

ASDI available to forecasters in NMAP2



ASDI Animation:

Start: ~17 UTC June 29

End: ~05 UTC June 30



Recent Activity:

Winter Weather Experiment

Ran 11-22 February 2013 with focus on:

- Increasing efficiency of Area Forecast production
- Increasing efficiency of AIRMET and SIGMET production
- Use of higher resolution tools
- Use of ensembles and their tools
- Virtual component with HMT winter experiment during week 1

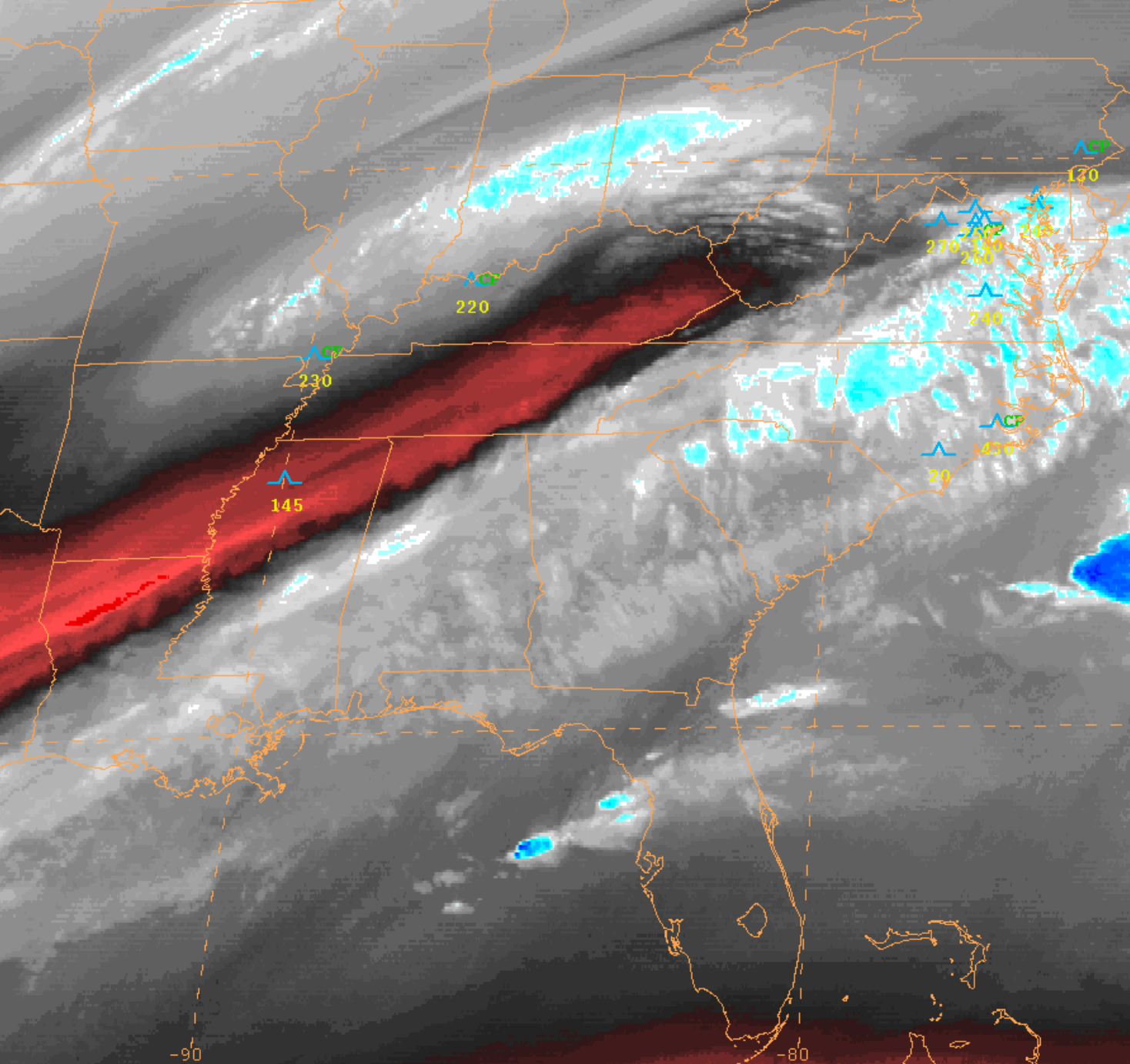
Winter Weather Experiment: GOES-R Proving Ground

GOES-R Product	Operational Status
Fog and Low Stratus	AWC ops – July 2012
Simulated Satellite Imagery (NSSL-WRF and NAM Nest)	Testbed – ops 2013
ACHA Cloud Height Algorithms	Testbed
Flight Icing Threat	Testbed
RGB Airmass	NAM ops – Oct. 2012

Simulated satellite imagery

Simulated imagery provides not only an aesthetically pleasing forecast tool, but also familiarizes the forecasters with the potential capabilities of the Advanced Baseline Imager.

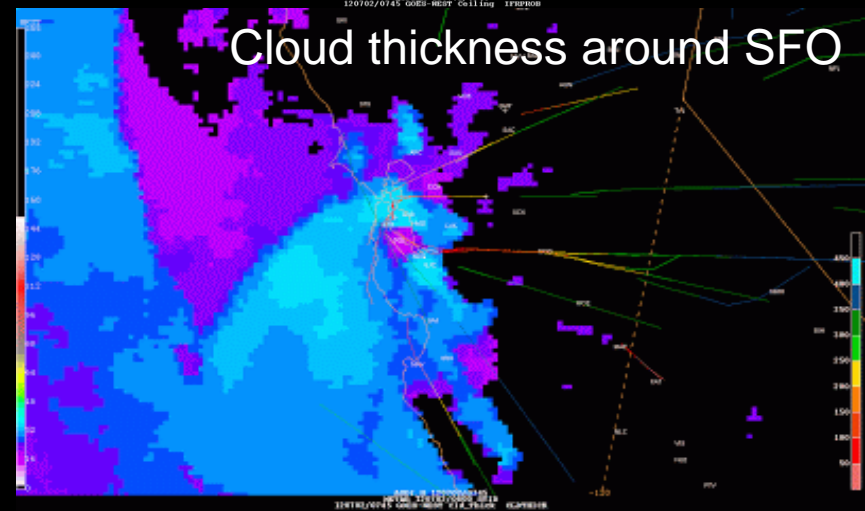
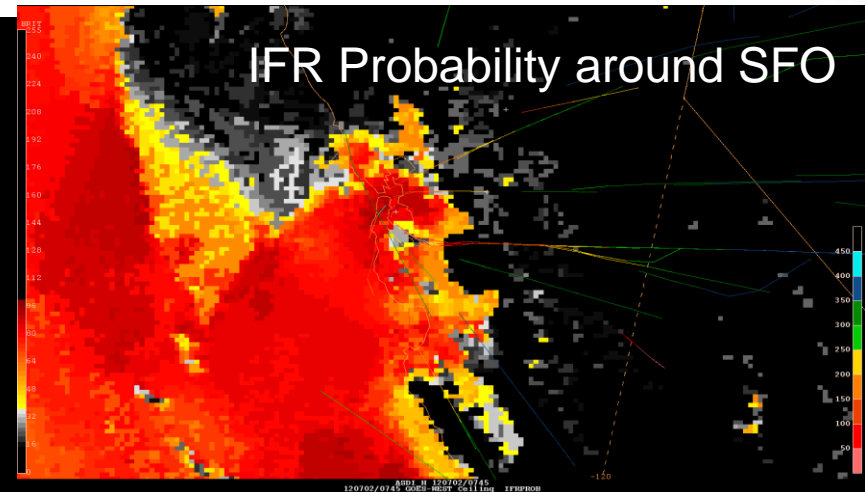
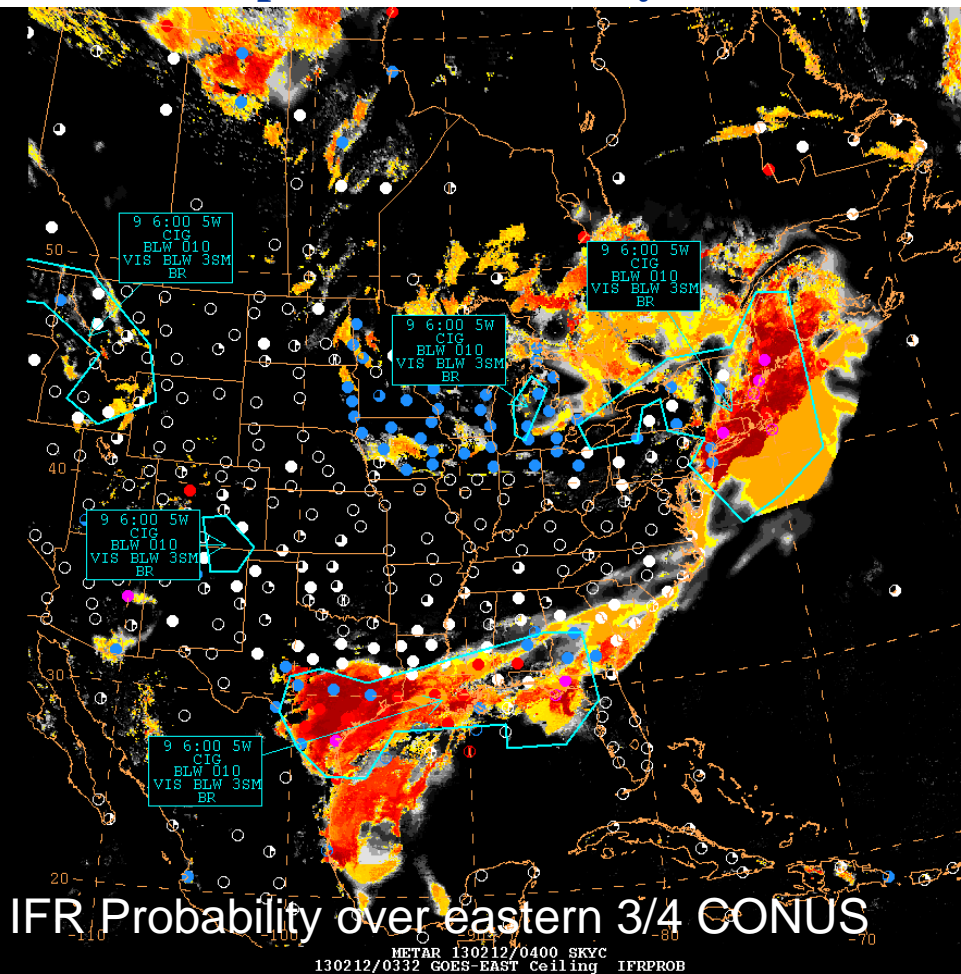
The first image is simulated WV from the NSSL-WRF and the second is the real GOES-13 WV imagery for the same time.



PIREP 130213/1500 TBSY>3 TTSY FELV
130213/1515 GOES13 WV

GOES Fog and Low Stratus

- Uses both model and satellite data to estimate probability of IFR conditions.
- Provides a good diagnostic tool for forecasters, providing additional information on current low ceiling extent.
- In AWC operations since July 2012

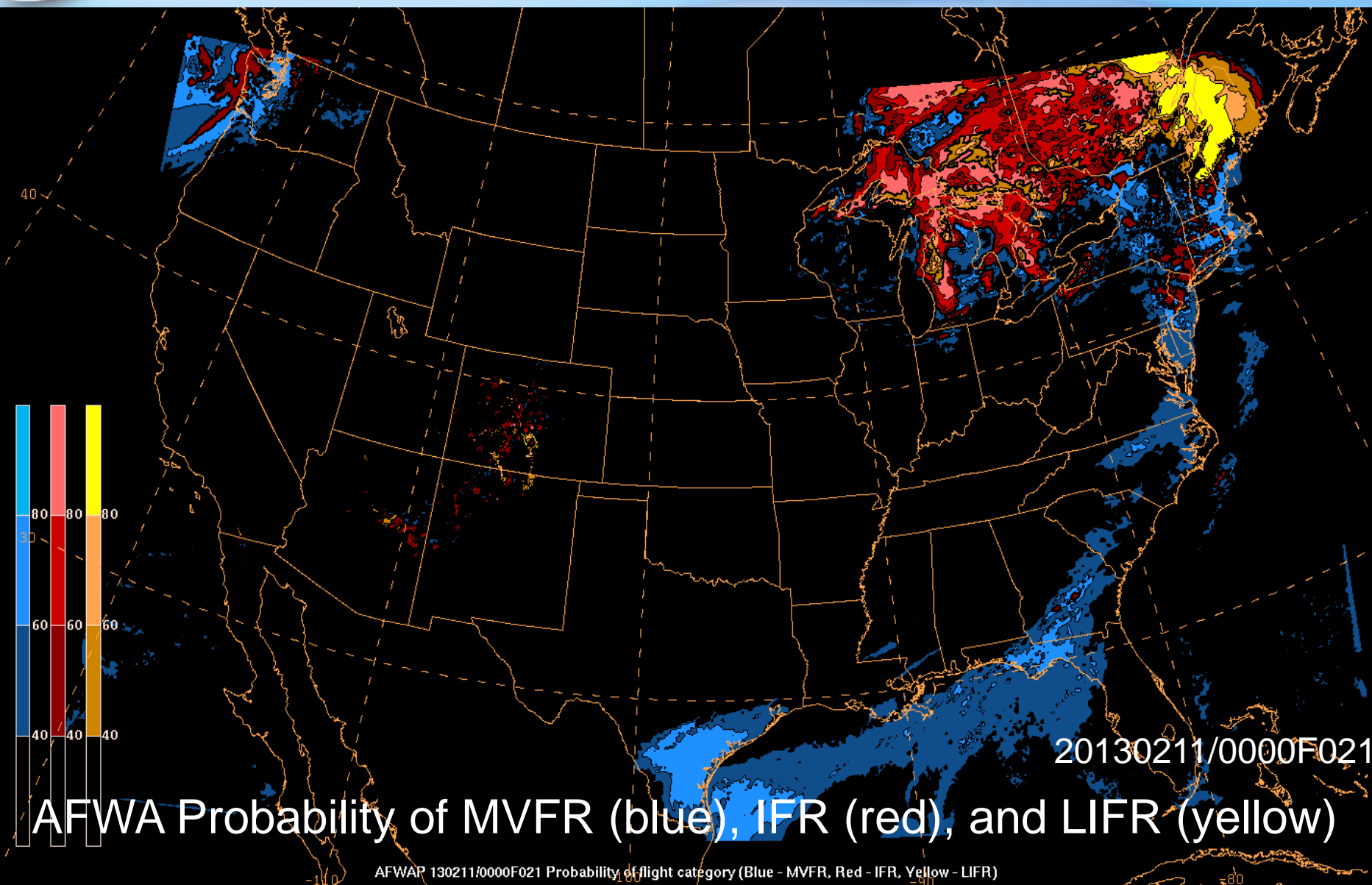




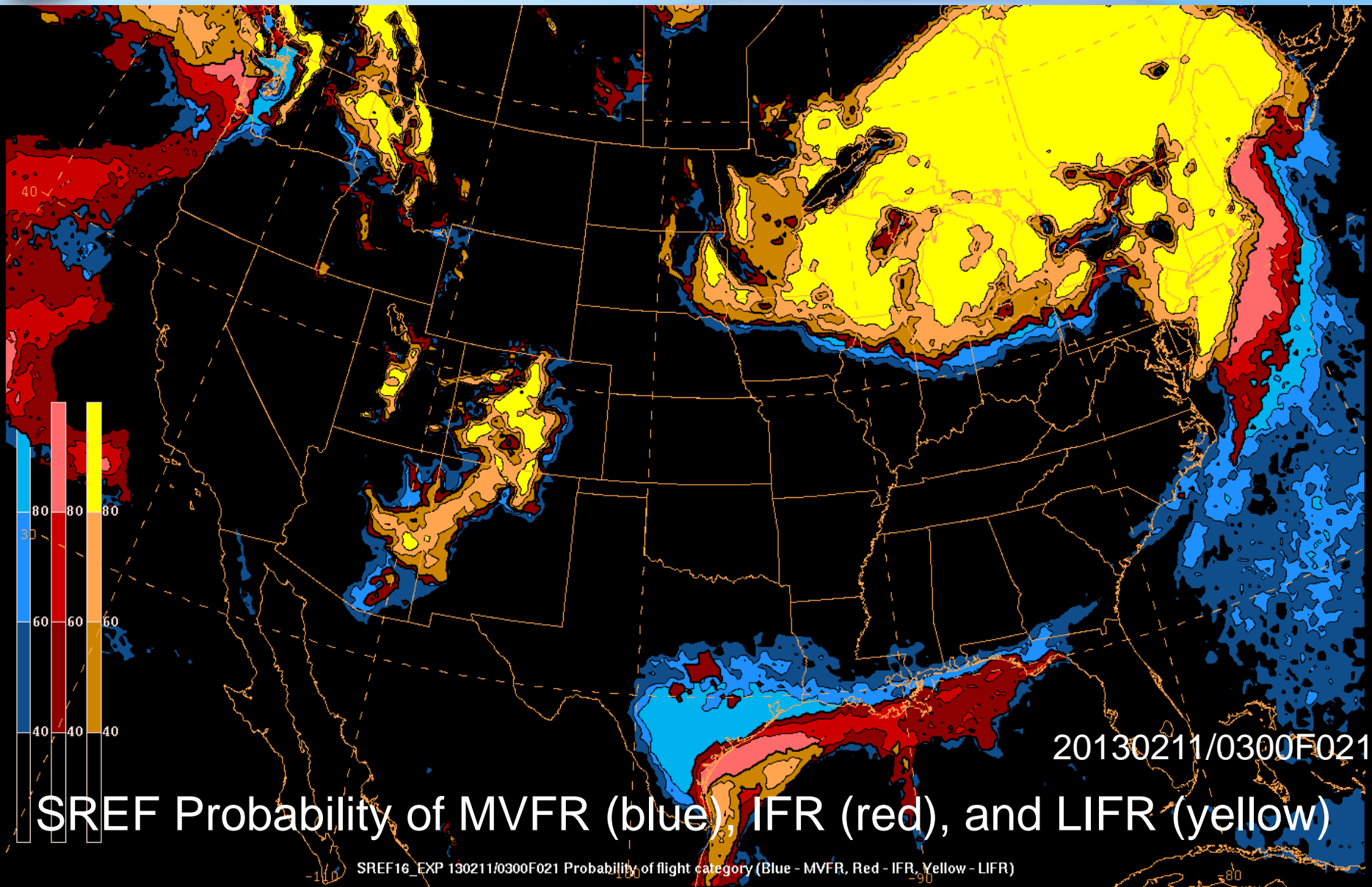
Winter Weather Experiment: Ensembles

- Collaboration with AFWA 10 member ensemble (~4 km)**
- SREF 22 member (~32 km)**
- Winter Weather Dashboard (from SREF) verification**

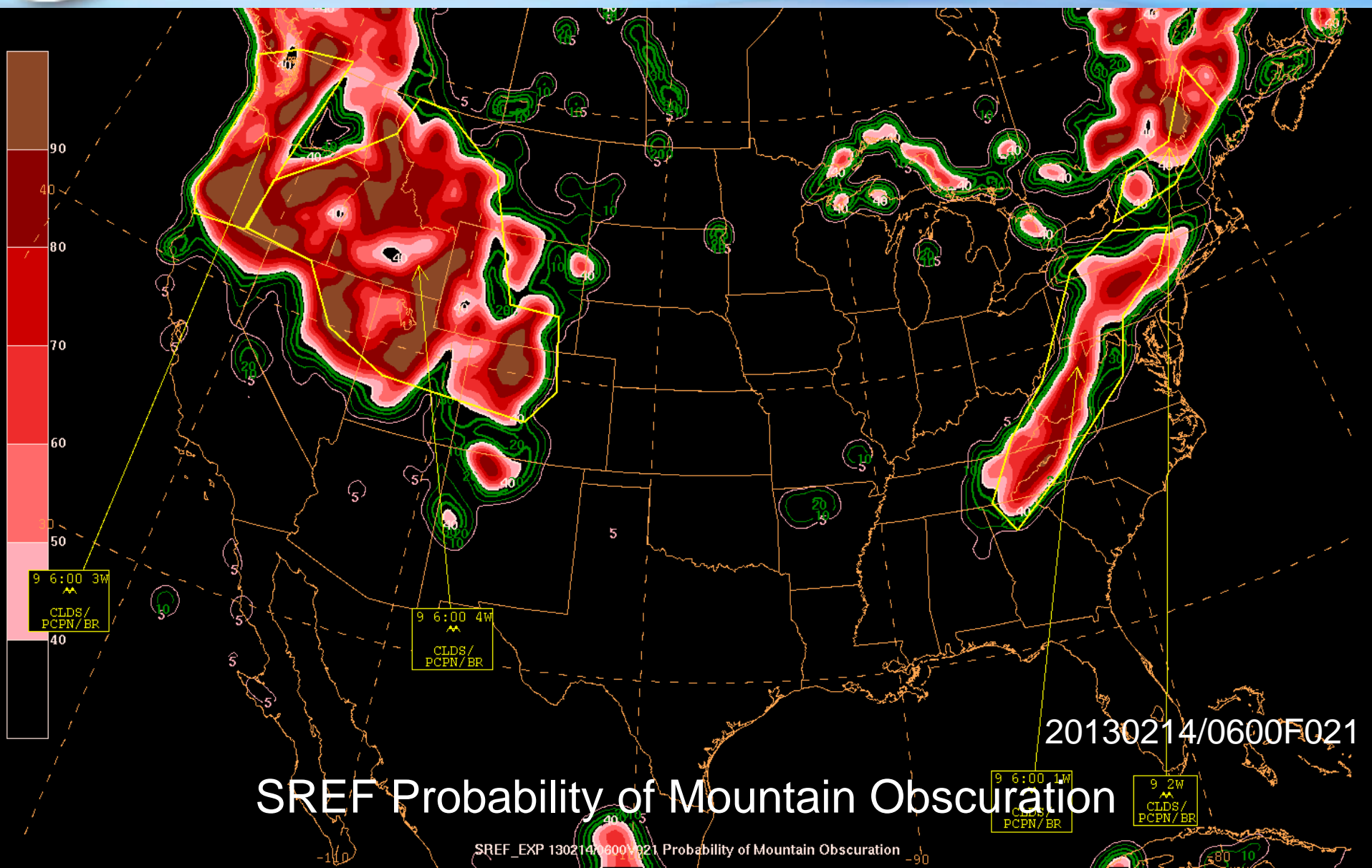
Ensembles: Ceiling & Visibility



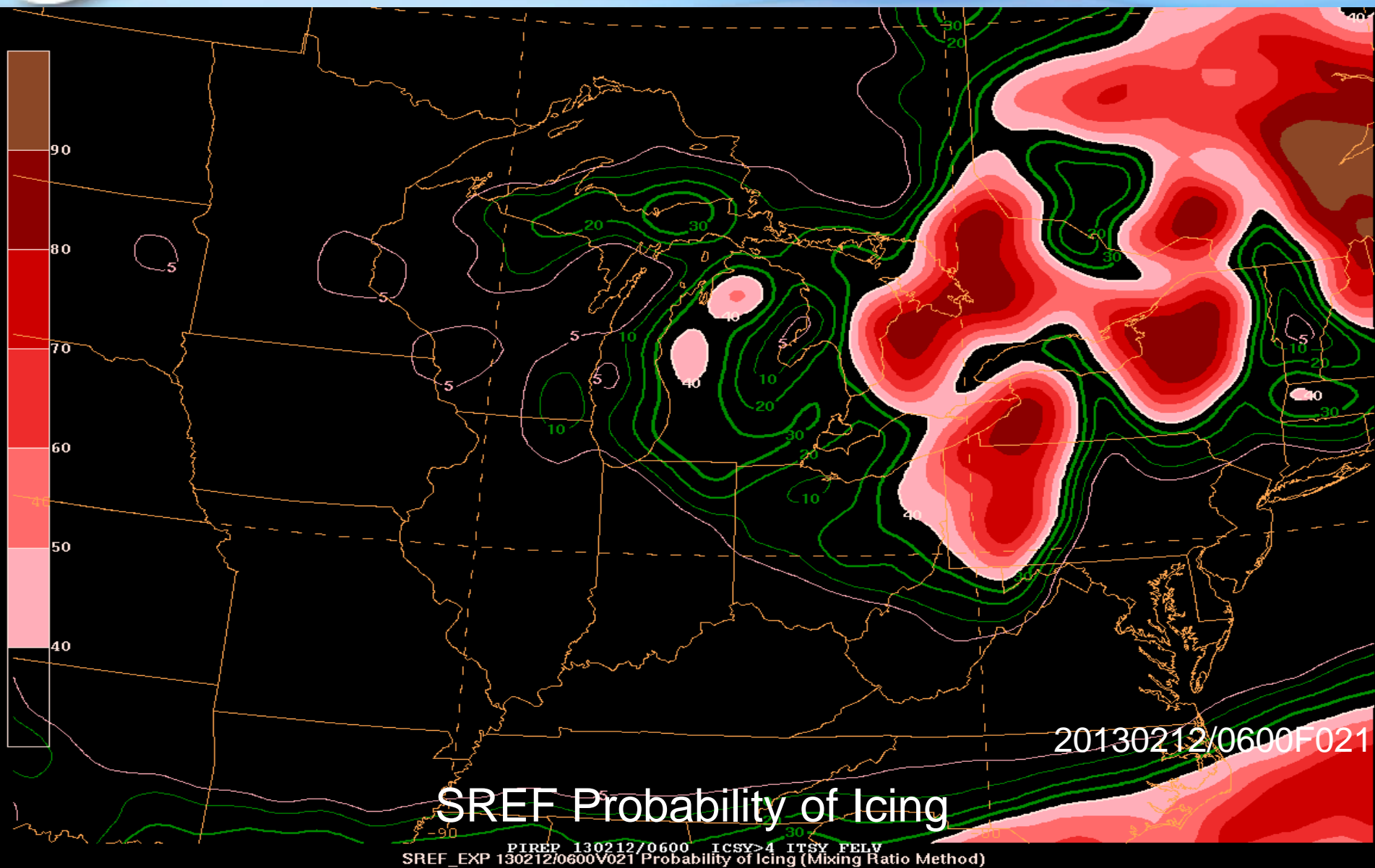
Ensembles: Ceiling & Visibility



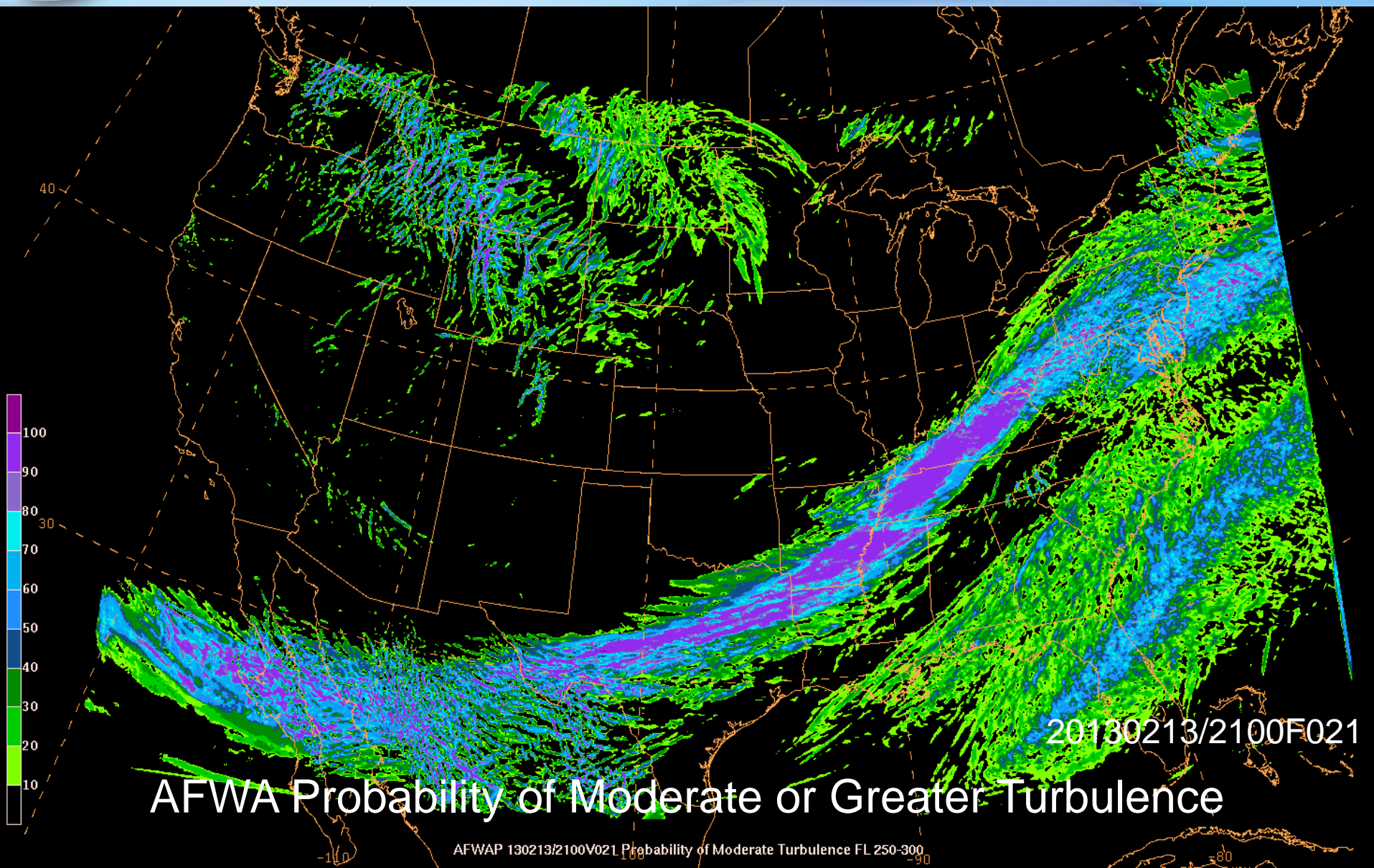
Ensembles: Mountain Obscuration



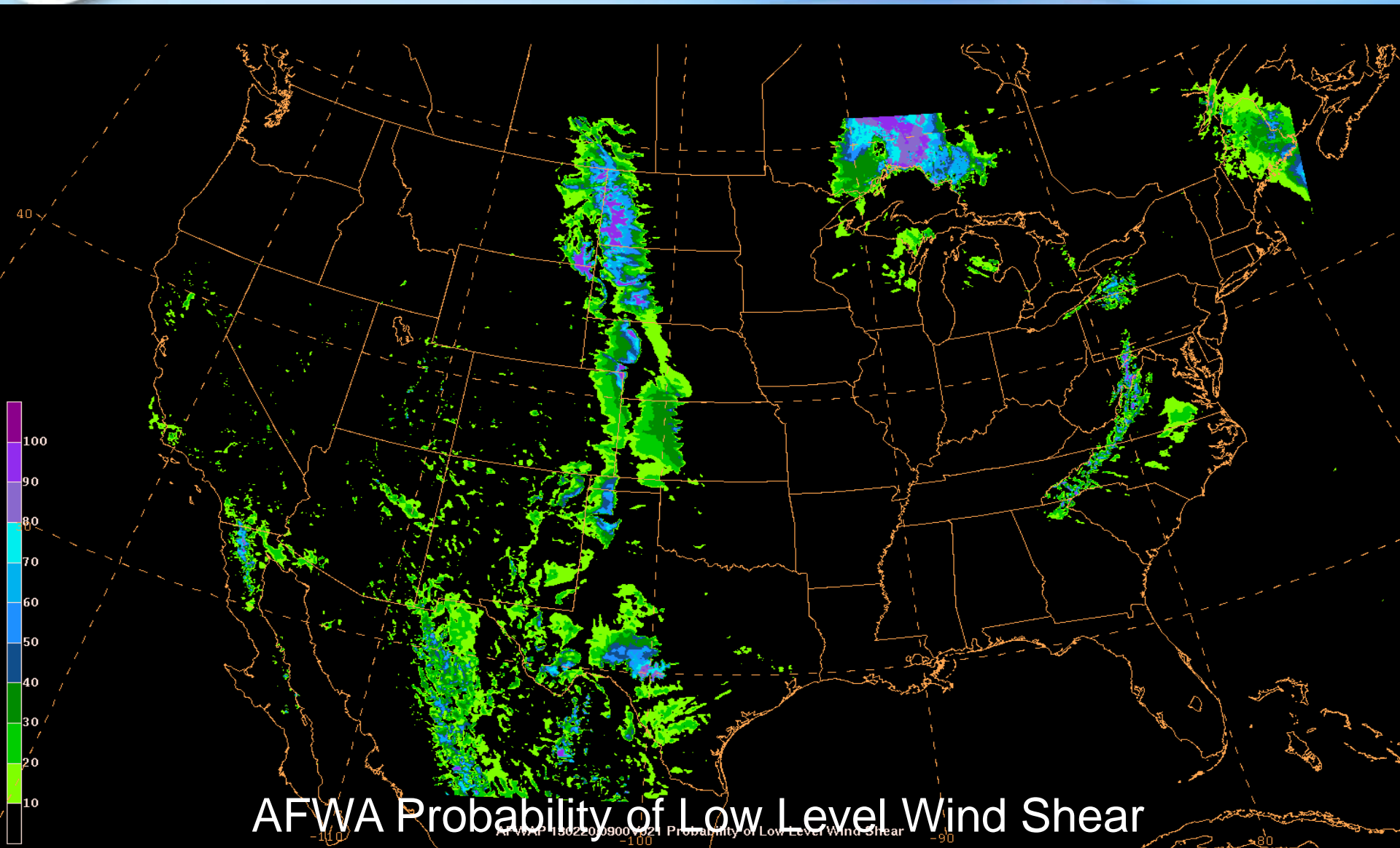
Ensembles: Icing



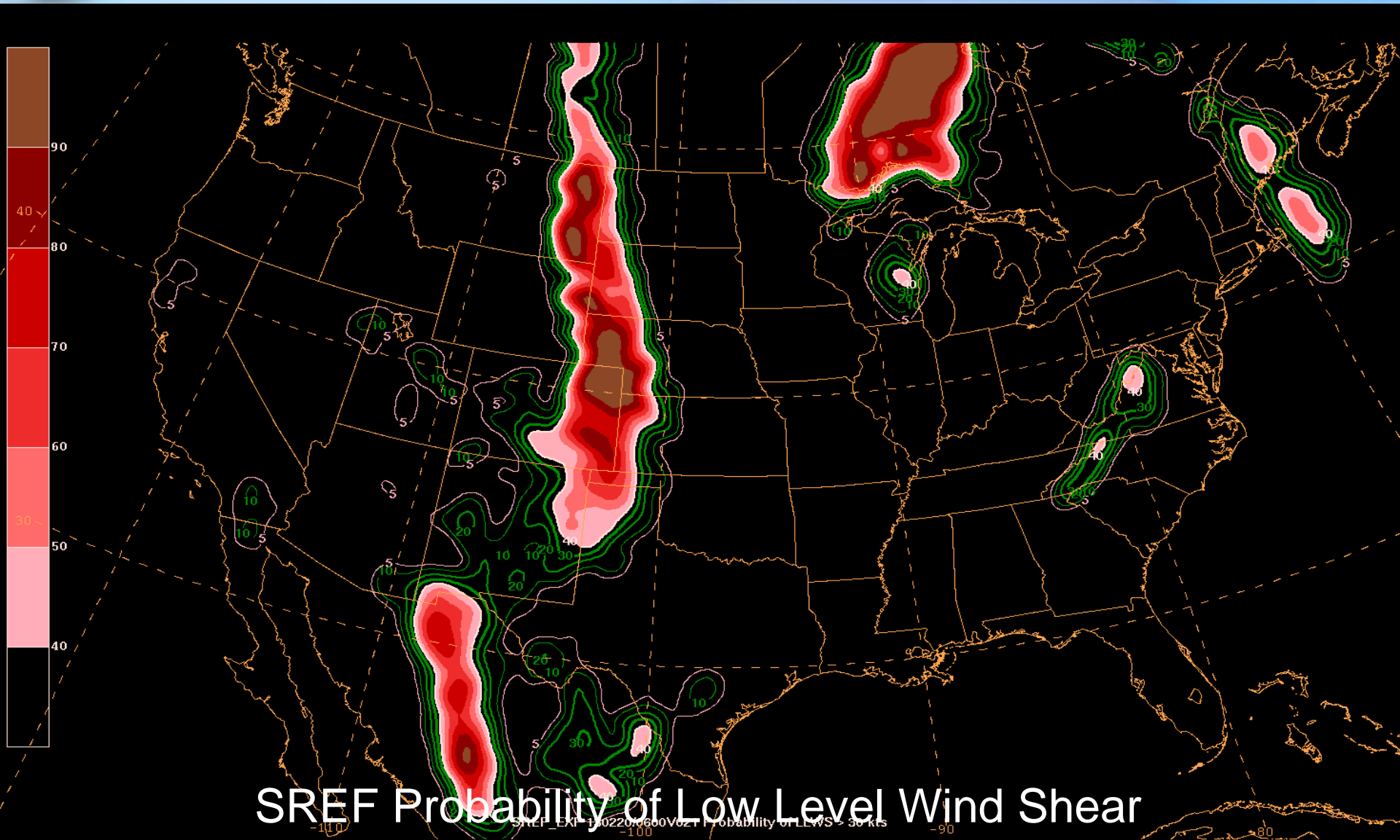
Ensembles: Turbulence



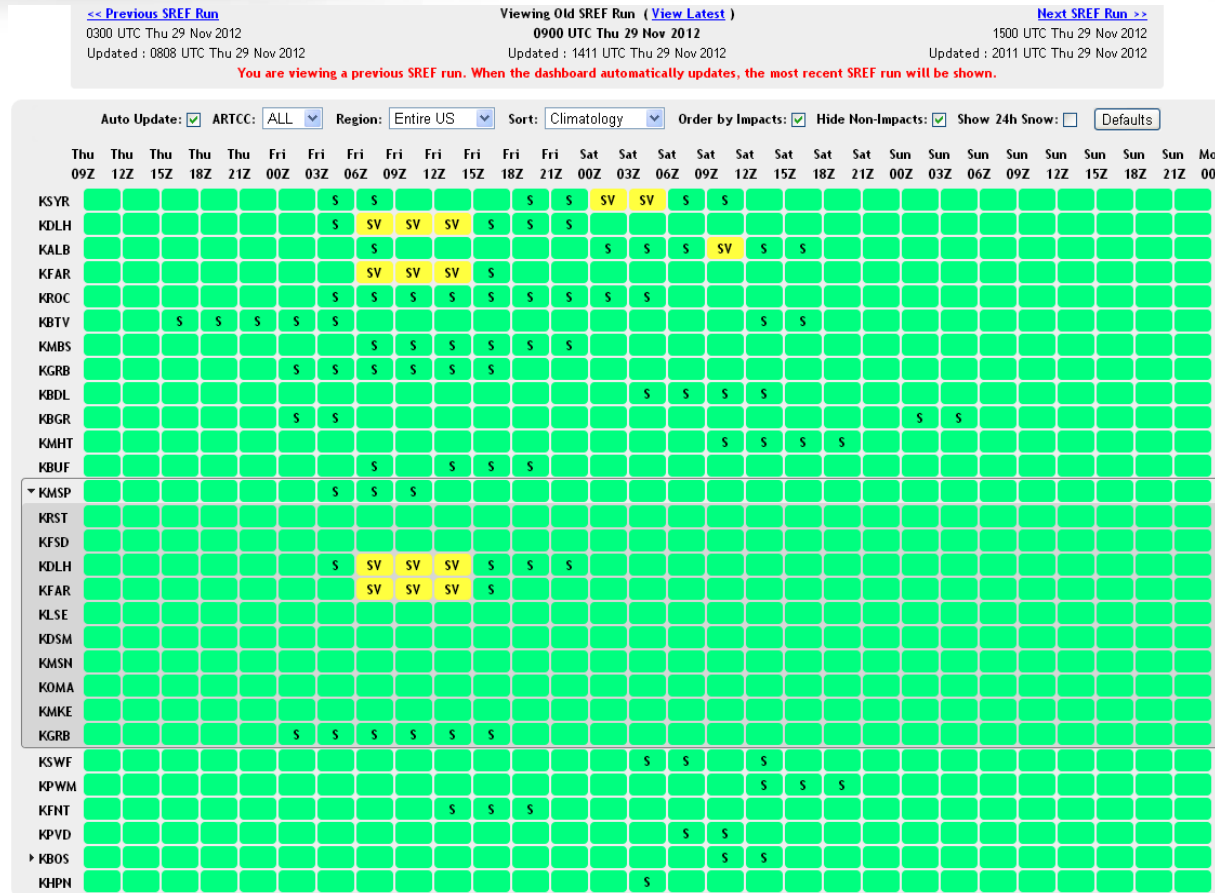
Ensembles: Low Level Wind Shear



Ensembles: Low Level Wind Shear



Winter Weather Dashboard Verification



Mouseover dashboard boxes above to display detailed impact information for the selected airport and time period.

Impact Type: S : Snowfall F : Freezing Rain V : Visibility^[1]
 Impact Category: Nominal Slight Moderate High

The Aviation Winter Weather Dashboard is an experimental product hosted at the [Aviation Weather Testbed](#), located at the [NOAA Aviation Weather Center](#). Its purpose is to provide a decision support tool to alert operational meteorologists and air traffic managers to potential winter weather impacts at major airports.

[1] Impacts due to visibility are only displayed when 2m temperature $\leq 28^{\circ}\text{F}$.



Winter Weather Dashboard Verification

- ➔ **SREF performs well in general for timing and intensity of snowfall events**
 - ➔ **There are some notable misses but the majority of cases have skill to aid in decision support**
- ➔ **SREF does not perform well with respect to visibility (but you have some improvement when limiting to visibility when it is snowing)**
- ➔ **SREF performs worse for ceiling than visibility, especially during snow**



Moving $R \rightarrow 0$

→ Phase 1

- Product not yet at 80% reliable, so only available on testbed network. Keep stats on reliability
- Prepare training documentation specific to the forecast desk.
- If product not able to be 80% reliable, poll forecast staff on if they'll use it.
- Feedback from SOO and support staff.



Moving $R \rightarrow 0$

➔ Phase 2

- ➔ Product reliable for two weeks and training provided, so product is now available to forecasters on ops network. Keep stats on reliability.
- ➔ SOO or focal point polls forecasters, checks trouble tickets, e-mails, or shift log for comments and forwards no less than weekly to provider.



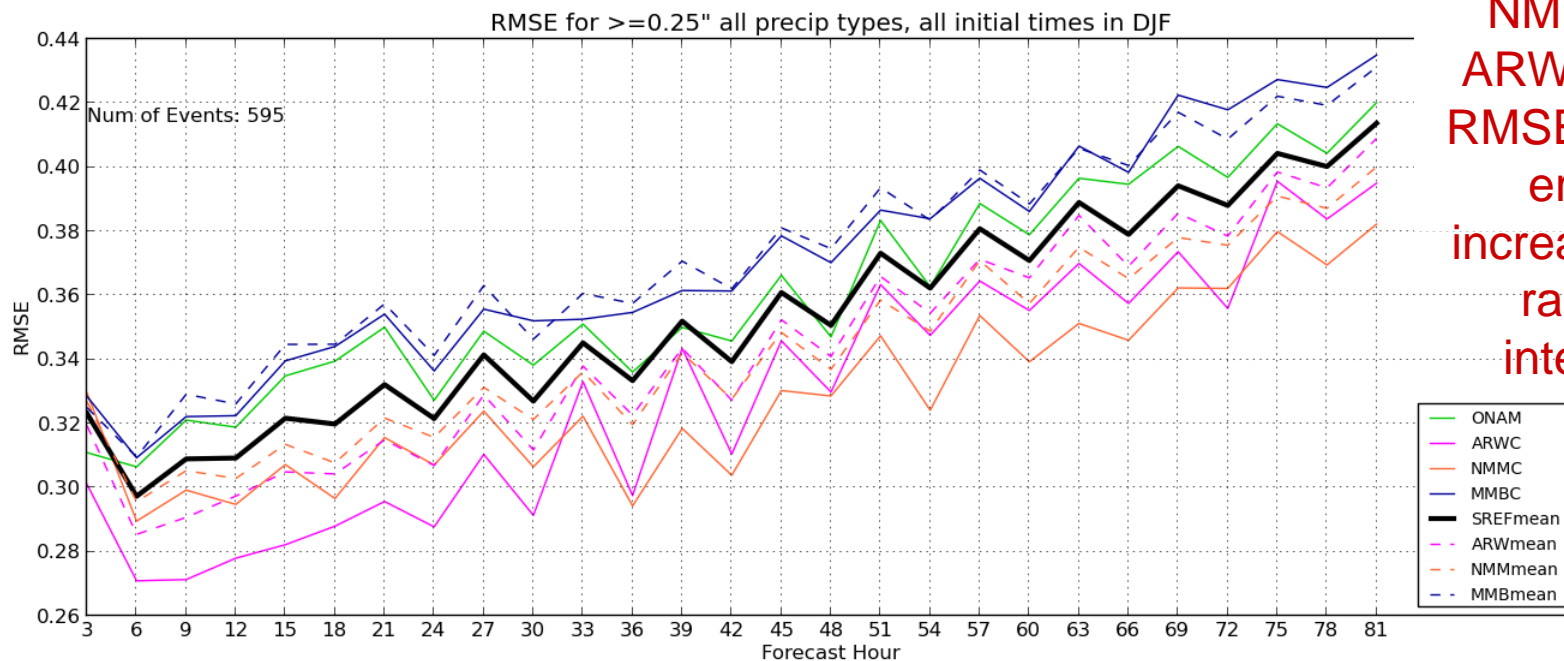
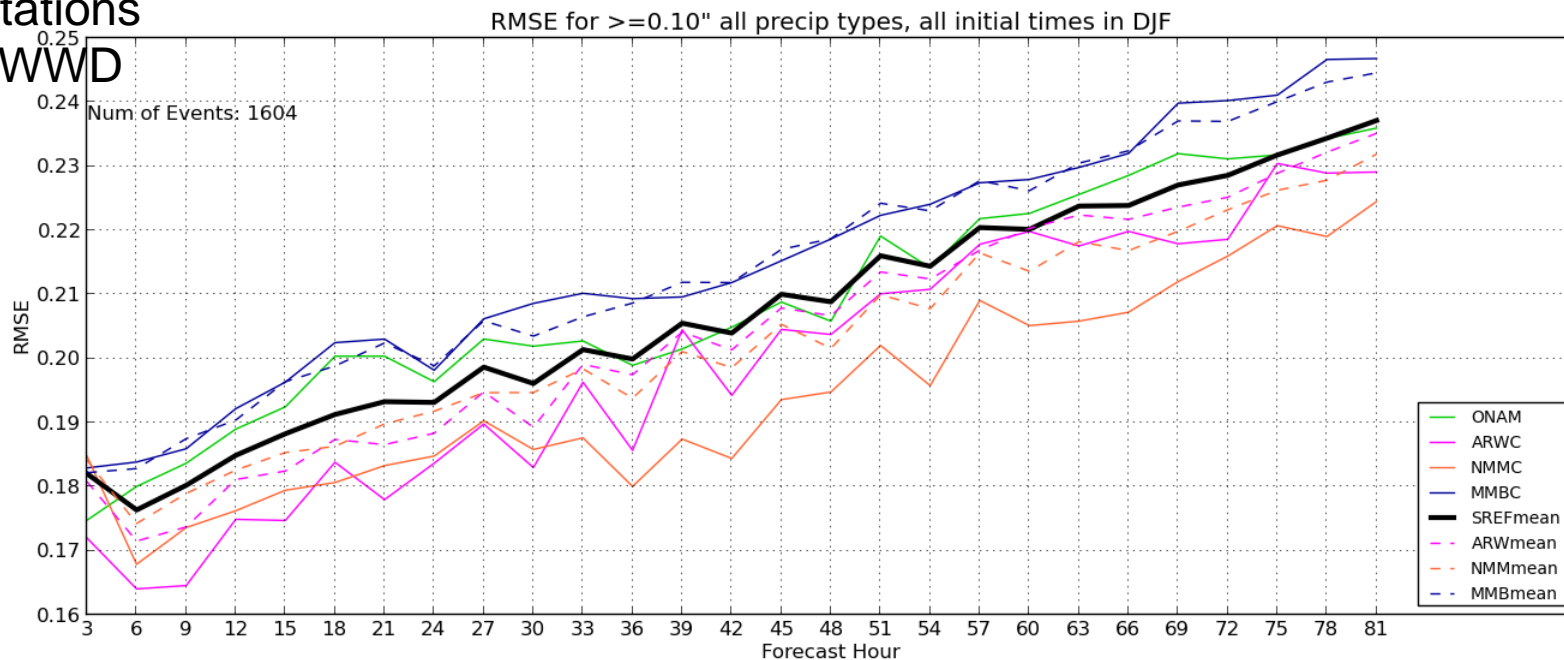
Acknowledgements

- **David Bright, Chief, Aviation Support Branch**
- **Amy Harless, ensembles**
- **Ben Schwedler (NextGen, dashboard)**
- **Amanda Terborg (GOES-R)**
- **Steven Lack and Brian Pettegrew (verification)**
- **Ryan Solomon (experiment manager, feedback)**
- **Dan Vietor (ADSI visualization)**



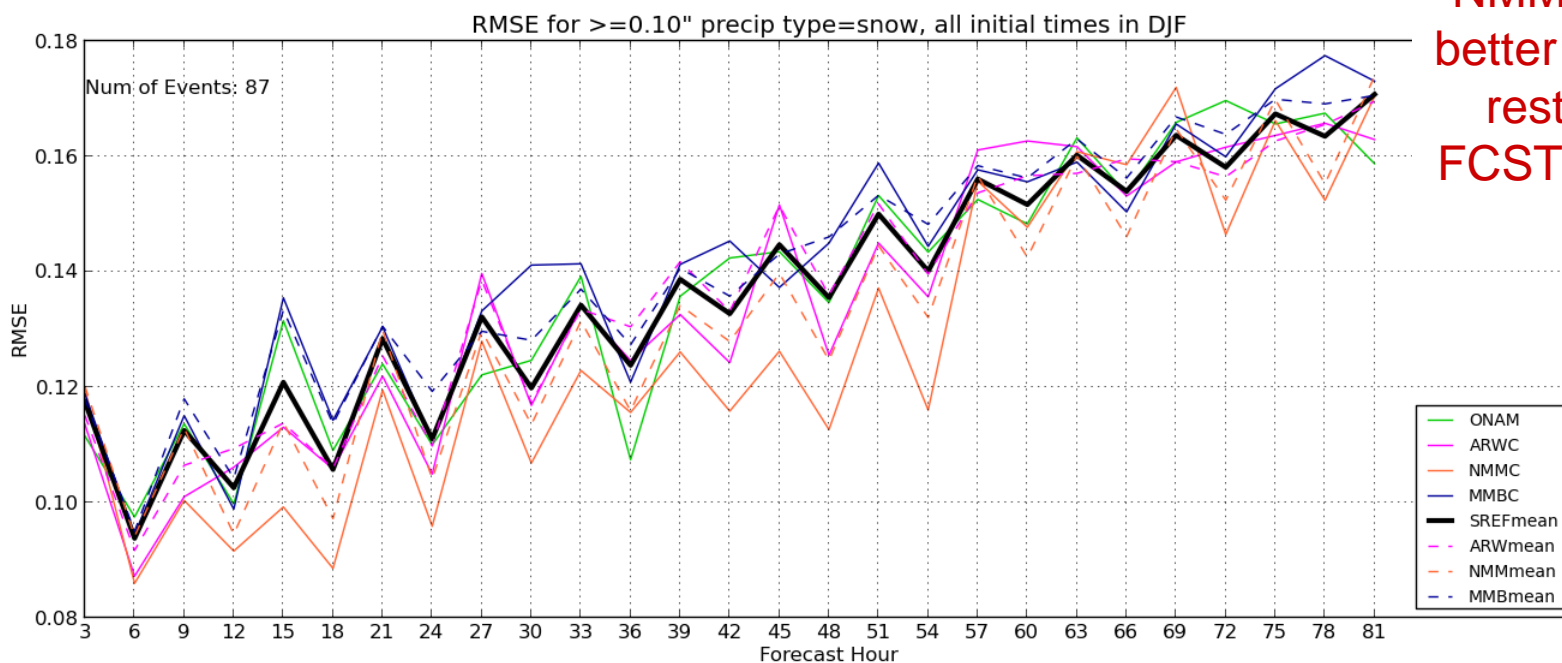
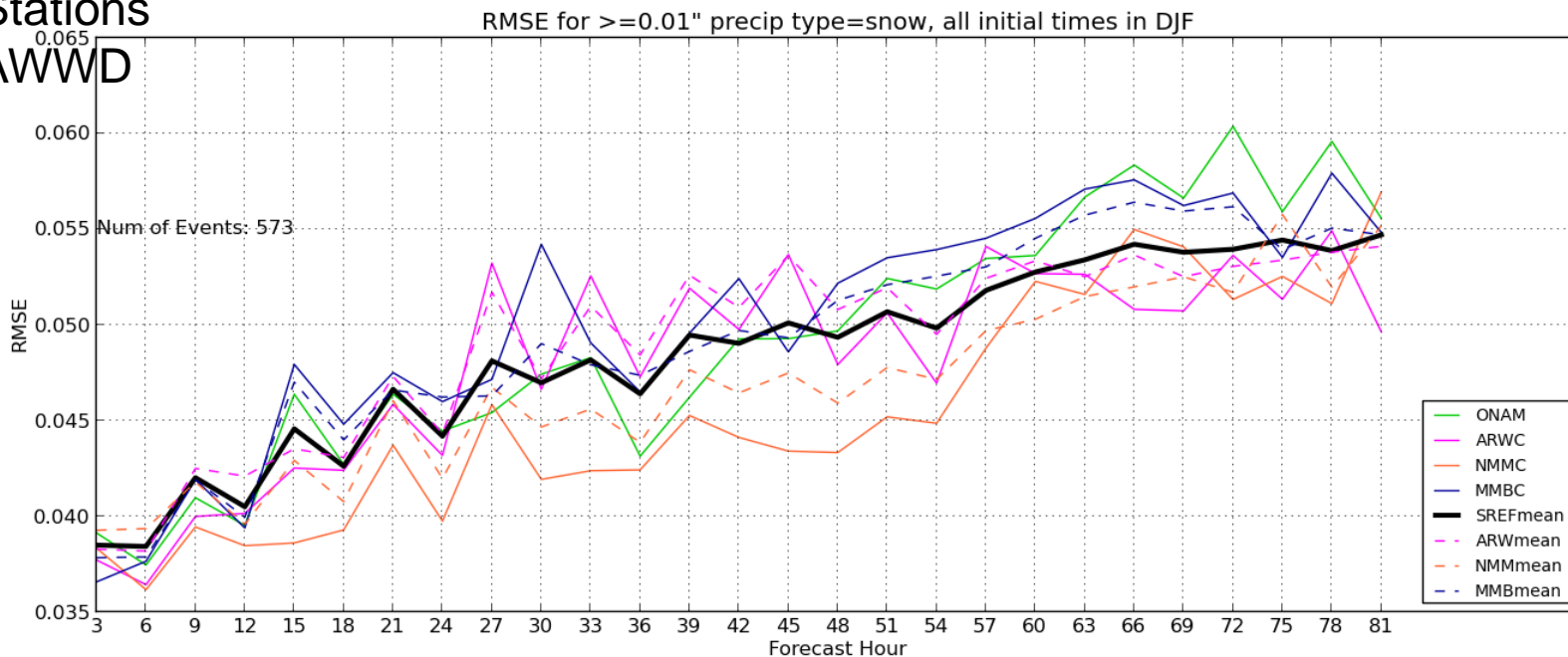
Back up slides

All Stations in AWWD

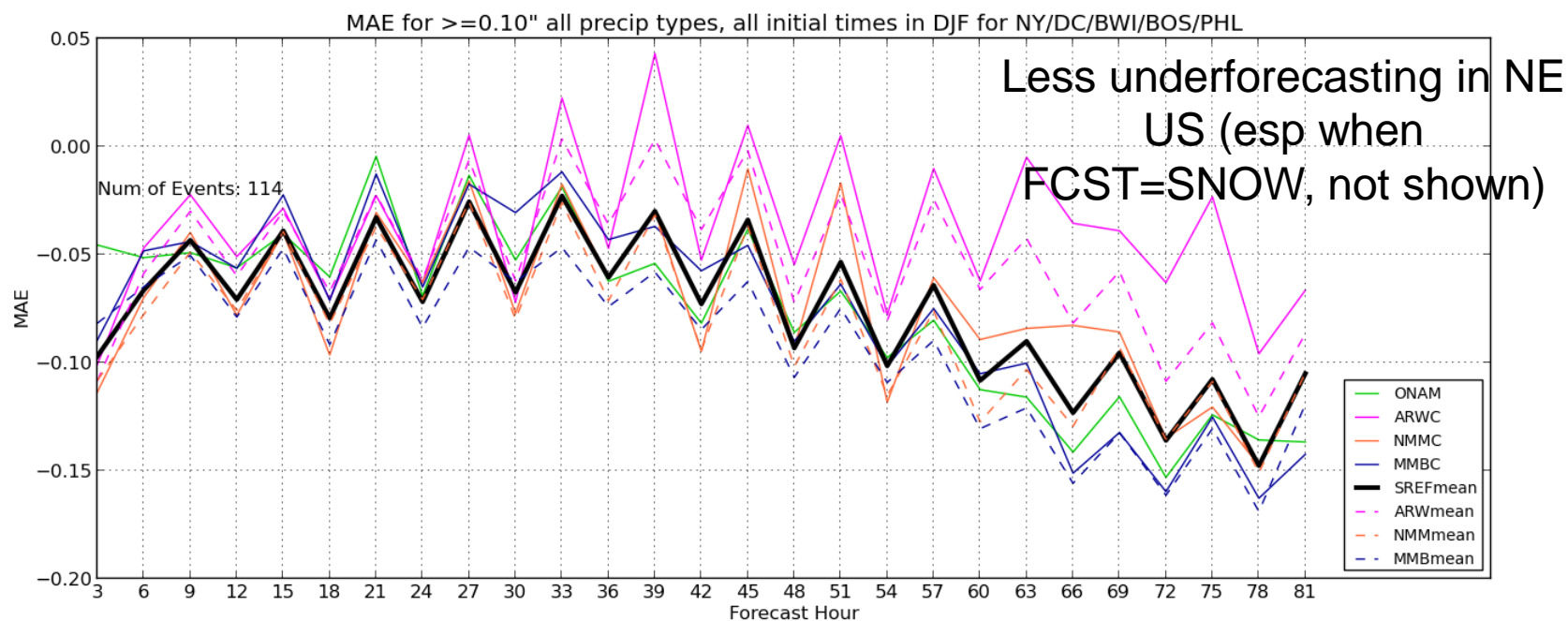
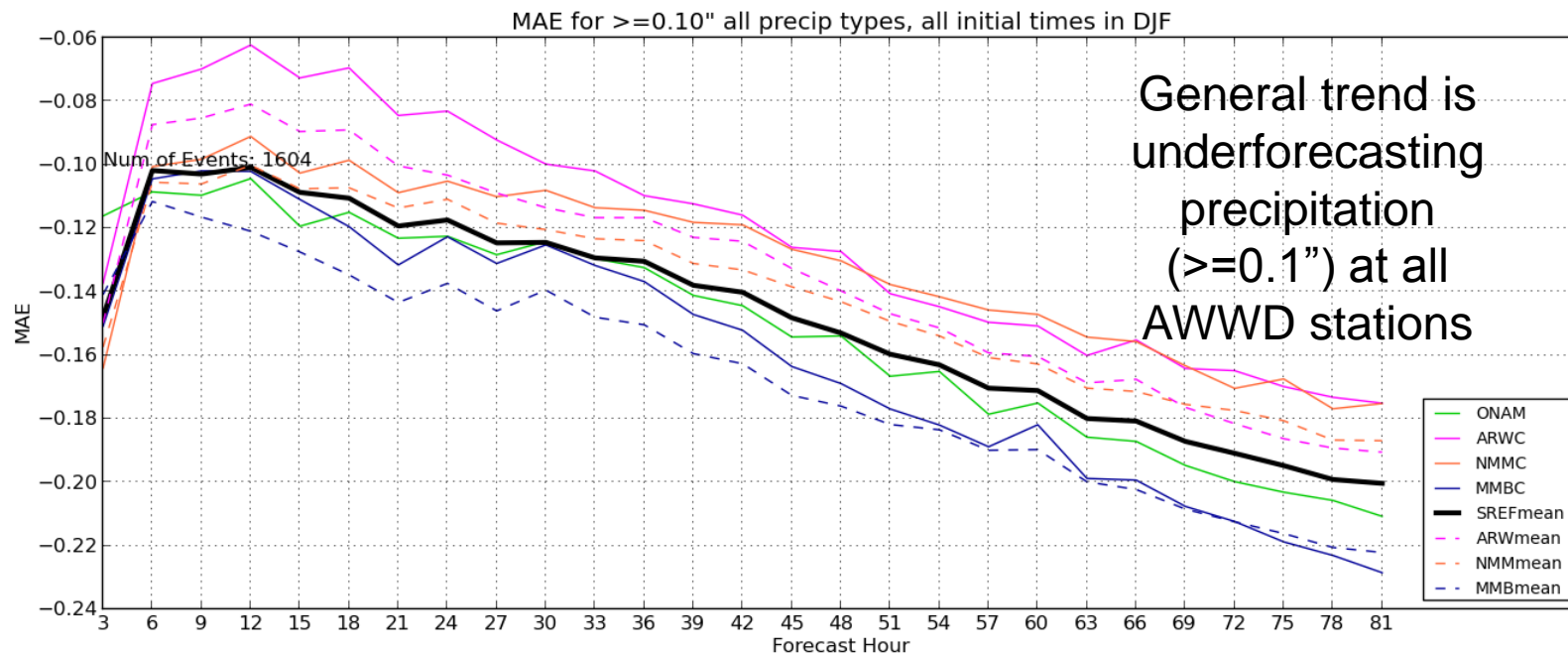


NMM and
ARW lowest
RMSE errors,
errors
increase with
rainfall
intensity

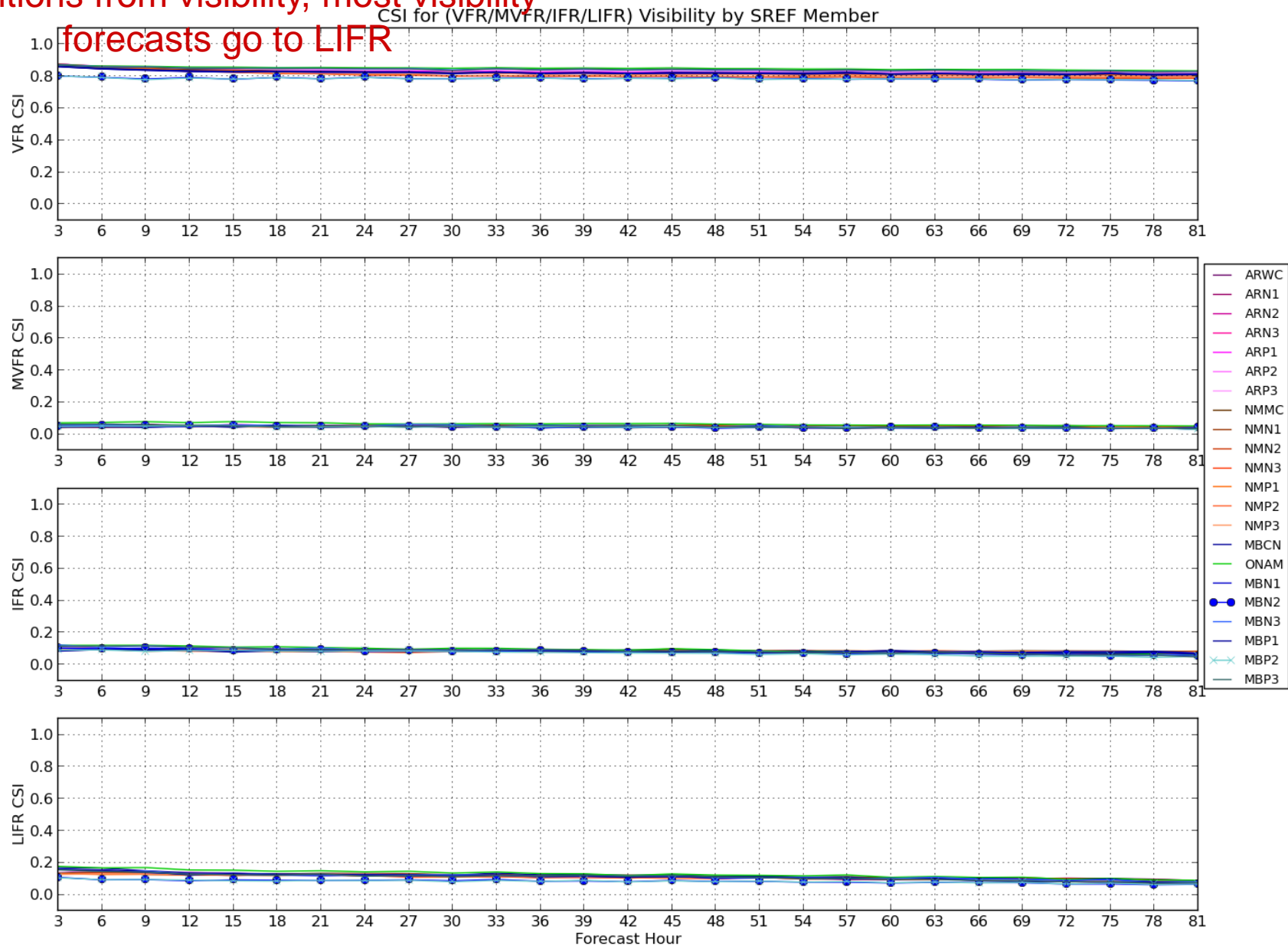
All Stations in AWWD



NMM slightly
better than the
rest when
FCST=SNOW



Very little skill in resolving flight conditions from visibility, most visibility forecasts go to LIFR





Experiment survey notes



Feedback – Ceiling & Visibility

- ➔ **Positive remarks for simulated GOES-R imagery**
- ➔ **Some of the models did not resolve the western CONUS very well**
- ➔ **High resolution models did not discriminate between LIFR, IFR, MVFR very well**
- ➔ **NSSL 4 km was a bit better and could be used to tweak C&V polygons**




Feedback – Ceiling & Visibility

- ➔ **SREF mountain obscuration seen as a move in the right direction and a potentially useful product for forecasters**
- ➔ **NCVA can be useful especially if overlaid and compared to satellite imagery**



Feedback – Turbulence

- **GTG composites (FL180-FL450) are too broad**
 - but smaller layers (FL350-FL400, FL300-FL350, etc) are more useful
- **GTG tops and bottoms are too noisy with the labeling**
 - but the labeling used on the SREF TKE was well received
- **AFWA turbulence product labels too noisy**
- **AFWA over forecasted low level turbulence**
 - but it captured the pattern



Feedback – Turbulence

- **SREF TKE below FL180 did poor over mountainous terrain (only one case, though)**
- **In-situ EDR is well received (“it’s the bomb”)**



Feedback – Icing

- SREF RAP Icing algo did well locating regions of icing
 - but tended to over forecast
- FIP did well in short-term (out to 6 hours)
 - Worsened at 9 and 12 hours
- Generally positive remarks about global FIP. Seen as a potentially useful tool.
- RAP Icing AB algo too “blocky” to gain much information.
- RAP Icing -20C/-22C/-25C height products need better contour resolution.



Feedback – Icing

- ➔ RAP Icing -20C product with subsidence suppression seemed to be most useful
- ➔ RAP Icing 10-18 kft composite layer used the most
 - ➔ but too thick – forecasters would like 10-14 kft and 14-18 kft